

## **New prototype brings Volvo closer to zero emissions**

The hunt for zero emissions continues! Volvo's latest step in the top-priority development of cleaner petrol engines is a prototype that meets the Californian LEV (Low Emission Vehicle) requirements – which correspond to the EU 2000 legislation.

The catalytic conversion technology in today's Volvo cars eliminates up to 95 per cent of the hazardous emissions of carbon monoxide, hydrocarbons and nitrogen oxides.

In order to meet increasingly stringent future demands, however, the petrol engines and emission control technology must be further refined. For some years, Volvo has been working on the development of a technology that can satisfy the LEV requirements with cost-effective solutions.

The Researchers have set up two clear priorities:

- A sharp reduction in cold-start emissions, since 90 per cent of carbon monoxide and hydrocarbon emissions take place during the first minute after starting the engine.
- Advanced engine management, aimed primarily at reducing nitrogen oxide emissions when the engine is warm.

### **Four technical solutions**

In order to solve these two main problems, Volvo has developed a prototype which has four important technical elements:

- A new type of fuel injector that makes it possible to start the car with a leaner fuel mixture without impairing driveability. The technique means that start emissions can be reduced by 60 per cent during the critical first minute.
- Multi-layer technology inside the catalytic converter. New ways of combining base metal oxides and suitable precious metals in separate layers lowers light-off temperature – i.e. the temperature at which the catalytic converter begins to work – by about 20 degrees. This means that the catalytic converter starts to function quicker and the emissions when starting the engine are consequently reduced. An added benefit is that the catalytic converter has a longer service life.
- A new engine management system, which controls the fuel-air mixture even more effectively and precisely. When the operating conditions for the engine change – in conjunction with acceleration, for example – the engine management unit performs complex calculations foreseeing what

is going to happen and thereby adjusting the fuel-air mixture more quickly for the lowest possible emissions.

- A new linear lambda sensor replaces the first of today's two binary sensors. The linear sensor can correct deviations from the ideal fuel-air mixture with greater precision than the binary one. This provides better regulation in conjunction with sudden acceleration, for example. The design of the two sensors in the LEV prototype also means that they can be heated faster, which allows the lambda control to start earlier than it does in today's engines.

### **Close to zero**

Tests of the new technology have yielded very good results. The emissions from the engine are almost totally eliminated once it is warm, while the emissions during the start-up phase are substantially reduced. This prototype satisfies the LEV requirements for carbon monoxide, hydrocarbons and nitrogen oxides with a god margin.

At the same time as working on the LEV prototype, Volvo is pursuing research aimed at meeting even higher criteria for ULEV (Ultra Low Emission Vehicle).